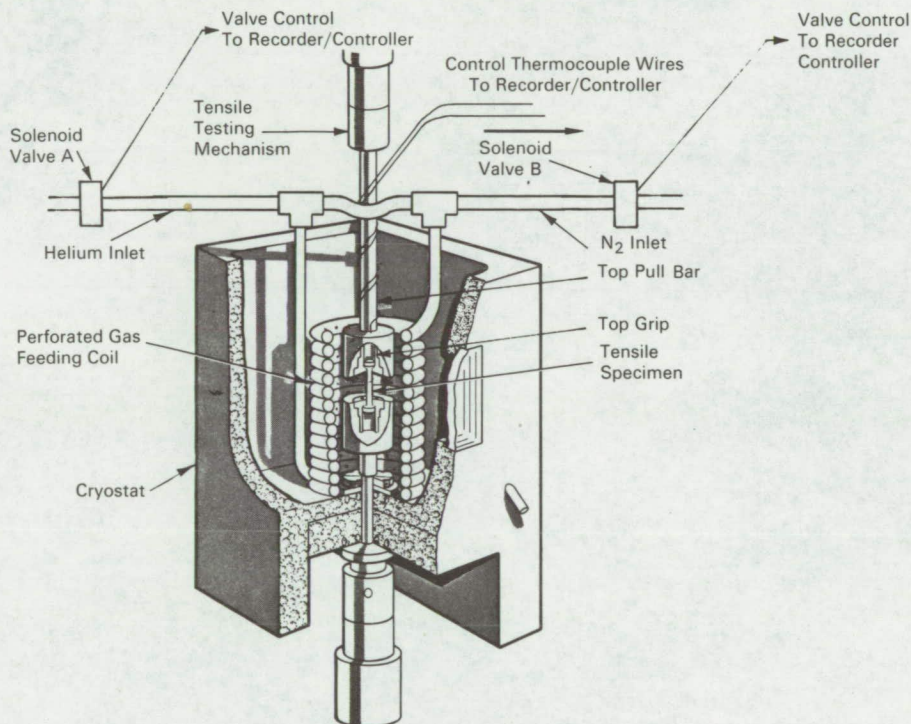


# AEC-NASA TECH BRIEF



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## Environmental Control System for Cryogenic Testing of Tensile Specimens



### The problem:

To devise a test system to permit the tensile testing of specimens which may be subjected to temperatures anywhere between liquid nitrogen (190° R) and room temperature. A method was needed to bring the test specimens to the desired temperature quickly and accurately, and with minimum complication.

### The solution:

Surround the test specimen zone with a special coil which permits the selective flooding of the specimen with warm or cold gas.

### How it's done:

The tensile specimen is mounted in a cryostat. An iron constantan thermocouple is fixed permanently at the junction of the top pull bar and top grip (a position which need not be changed between tests). A coil which is perforated on the inside diameter surrounds the specimen. If the specimen is to be cooled, solenoid valve A is closed and B is opened. This blocks the entry of warm helium and allows the passage of cooling nitrogen, which enters the coil at the top and bottom. Temperature is sensed by the thermocouple

(continued overleaf)

which drives an adjacent recorder/controller. As the temperature drops below the preset value, the controller closes valve B and opens valve A, allowing the entry of the warm helium. Since the gases operate under pressure, their effect upon specimen temperature is very rapid.

**Notes:**

1. This technique has been employed in the tensile testing of beryllium and has afforded control within  $\pm 2^\circ\text{R}$  from  $190^\circ\text{R}$  to room temperature.
2. The method is less expensive and easier to integrate into the test setup than conventional environmental systems.

3. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
AEC-NASA Space Nuclear Propulsion  
Office

U.S. Atomic Energy Commission  
Washington, D.C. 20545

Reference: B67-10618

**Patent status:**

No patent action is contemplated by AEC or NASA.

Source: E. F. Vandergrift and G. O. Yatsko  
of Westinghouse Astronuclear Laboratory  
under contract to  
AEC-NASA Space Nuclear Propulsion Office  
(NUC-10523)